UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107-4431

Mr. Steve Lehman
Northern Division, Mail Stop No.82
Naval Facilities Engineering Command
10 Industrial Highway
Lester, Pennsylvania 19113-2090

JUN 3 1994

Subject: Naval Air Warfare Center (NAWC), Warminster, PA

Dear Mr. Lehman:

Please find below EPA comments on the "Final Design Submittal" for OU-1 at NAWC submitted to EPA under letterhead dated April 28, 1994, and received by EPA on April 29, 1994. These comments are being submitted pursuant to the conditions of a Federal Facility Agreement (FFA) for NAWC signed by EPA and the Navy on September 20, 1990.

Pl ase provide EPA an opportunity to review (and comment on, if necessary) the Remedial Design intended to be used for contract bidding purposes i.e. the "Draft Final Remedial Design". This "Draft Final Remedial Design" should address the EPA comments below and is considered by EPA to be a "draft final primary document" subject to dispute resolution per Section VII.7.2 of the FFA. EPA requests one week to conduct the review and comm nt on the "Draft Final Remedial Design".

DESIGN ANALYSIS REPORT

1.0 INTRODUCTION

1.1 Background Information

P. 1-3: Delete the last paragraph and replace with the following:

"Based on the findings of a Focused Feasibility Study (FFS) Report (prepared under CTO 0022), an interim remedy for contaminated groundwater attributable to Area A and Area B at the Site in overburden and shallow bedrock aquifers was selected in a Record of Decision (ROD) signed by the Navy and EPA on September 29, 1993 (see Appendix C for ROD). The ROD specifies the objective of the interim remedy is to minimize the migration of

contaminated groundwater attributable to Area A and Area B in overburden and shallow bedrock aquifers while further Remedial Investigations are performed to d termine the full nature and extent of contamination in these aquifers. Per the ROD, the selected interim remedy for OU-1 includes the following major components:

List ten bullets identified on pages 42 and 43 of the ROD

Performance standards for interim remedy, as identified in Section X. of the ROD, address the groundwater extraction wells, the groundwater treatment system, treatment of air emissions, management of waste treatment residuals, groundwater monitoring, five-year reviews of remedy performance and worker safety."

Page 1-9: The first sentence should be revised to read: "Per th ROD, a final remedial action for OU-1 will be selected, designed and implemented after the full nature and extent of groundwater contamination is identified."

An additional section should be provided in the Introduction after Sec. 1.1. and should read as follows:

"1.2 Purpose of Design Development Report

The purpose of this report is to present the design of the initial groundwater extraction well system and initial groundwater treatment system to be implemented as part of the interim remedy for OU-1. As specified by the ROD, the groundwater extraction well system and/or groundwater treatment system described in this report shall be modified as necessary during the implementation of the interim remedy based on the periodic evaluation of hydrogeologic data and the periodic evaluation of the effectiveness of the groundwater extraction wells. As a result, the scope of work under this contract will provide for modifications prior to or during the first year of system operation as necessary to ensure the effectiveness of the interim remedy. These modifications will include the installation and operation of offbase extraction wells in the event that offbase RI data or offbase RD data indicate this is necessary to ensure the effectiveness of the interim remedy."

p. 1-7: Table 1-3

Update as necessary per recent RI data for Areas A and B.

2.0 DESIGN PARAMETERS

First sentence should be revised to read: "The parameters utilized for the development of this design are based upon the

ROD, and recomm ndations of the FFS report, various Navy guides..."

2.1 Objective

First sentence should be revised to read: "The goal of the interim remedy for OU-1 is to..."

A second sentence should be added and read: "The objective of this Design Analysis Report is to describe the initial groundwater extraction system and initial groundwater treatment system to be constructed under the interim remedy for OU-1 and to provide a framework for modifications to this system prior to or during the first year of operation as necessary to ensure the eff ctiveness of the interim remedy."

3.0 TECHNICAL APPROACH

3.1 Groundwater Extraction Wells

First bullet, first sentence, should be revised to read: "This Interim Remedial Action is to address contaminated groundwater attributable to Areas A and B in overburden and shallow bedrock."

First bullet, last sentence, should read: "...will be confined to shallow bedrock."

Fourth bullet, third sentence should be revised to read: "At this time, the extraction well locations are limited to current NAWC property. However, offbase extraction wells will be installed and operated prior to or during the first year of operation if offbase RI data (or offbase RD data) indicates this is necessary to ensure the effectiveness of the interim remedy."

Fifth bullet should be deleted.

p.3-3: Second bullet

First sentence should be revised to read: "The extraction wells in Area A are located on NAWC property to minimize the migration of the contaminated groundwater attributable to Area A which has been characterized by RI data available at the time this document was prepared."

p.3-3: First full paragraph

Second sentence should be revised to read: "Nine extraction wells, spaced an estimated 85 feet apart, pumping at an average

of 6 gallons per minute per w ll are project d for Area A."

Third sentence should read per the comm nt above.

p.3-3: Last paragraph

First sentence should be revised to read: "In addition to the extraction wells, observation wells (or Remedial Investigation monitoring wells) will be provided..."

Third and fourth sentences should be deleted and replaced with the following: "Specific parameters to monitor the effectiveness of the system and to ensure there are no adverse effects from th system will included in Operation and Maintenance plans to be developed."

Table 3-1 should be deleted.

An additional paragraph should be added to the end of this section and read: "To confirm that extraction well system performance or intrusive activities in the vicinity of Area will not produce adverse effects on the quantity and quality of groundwater extracted by local groundwater users or on any wetlands, groundwater (and/or other) monitoring will be necessary."

p. 3-5: Sec.3.2

The first sentence should be revised to read: "The ROD specifies a combination of the following treatment technologies may be us d for this Interim Remedial Action."

4.0 SYSTEM DESCRIPTION

4.1.2 Groundwater Extraction

Page 4-2, first paragraph, third sentence, should be revised to read: "...is an estimated 86 gallons per minute."

Page 4-2, second paragraph, should be revised to read: "The estimated locations of the nine projected Area A extraction wells are shown on Drawing C-7. These wells are projected to be spaced 85 feet apart. Each of the Area A wells is projected to pump 6 gpm for a combined, estimated Area A groundwater extraction rate of 54 gpm. The actual number, location, nature and pumping rate of the extraction well will be determined by available RI data and the yield tests to be performed under this contract. The approximate capture zone of the extraction well system projected at this time for Area A is shown on Drawing C-7."

Page 4-2, third paragraph: Per th language above, the languag here should also be revised to refl ct the fact the system described in this section is an estimate and may differ from the actual system to be installed.

Page 4-3, first paragraph, last two sentences should be replaced with the following: "The projected locations of the observation wells are shown on Drawing C-12. Per the ROD, the purpose of the observation wells is to gather the data necessary to confirm hydraulic gradients and to characterize the response of the aquifer to pumping. The observation wells will be placed and constructed to: 1) confirm the capture zone configuration; 2) provide information regarding the plume configuration outside of the base boundaries (where applicable) and the plume's response to the initial extraction system; 3) ensure that the extraction w ll design and the aquifer's response to pumping does not provide a means of moving the plume into previously uncontaminated portions of the aquifer and 4) ensure that the extraction system does not adversely impact nearby industrial/residential wells. The actual location and nature of the observations wells will be determined upon completion of yield tests to be performed by the contractor. "

Page 4-3, second paragraph, from the fourth sentence on, should read: "During test pumping, water quality sampling and drawdown measurements will be taken at regular time intervals from both the pumped well and any nearby wells. This data will be evaluated to provide additional information regarding groundwater quality and hydraulic characteristics of the shallow bedrock aquifer. The use of a boring for extraction well purposes will be determined based on an evaluation of this data and yield data."

Page 4-3, after the first two sentences, the third paragraph should be revised to read: "After the performance of each yield test, water quality and hydraulic data will be compared against the assumptions used in developing the extraction well system and observation well network described in this report and necessary adjustments will be made to the yield tests, the actual nature and number of extraction wells (and their associated pumping rates) and observation wells to be installed under this contract. Hydrogeologic data generated prior to and during system operation and additional RI data will be periodically evaluated to determine any modifications that should be implemented prior to or during the estimated one year of system operation under this contract."

4.2.1 Area A and Area B Groundwater Extraction and Transfer Subsystems

Page 4-12, fourth paragraph: The actual capacities of the individual groundwater extraction well pumps required for Areas A

and B are unknown at this time. The d sign should provide for a range of pump capacities. The actual capacity of the pumps needed will only be determined after yield tests are completed.

Page 4-13, fourth paragraph: The actual capacities of the groundwater transfer pumps should be indicated in the design. In any case, the contract should include the flexibility necessary to provide for transfer pump capacities that may be needed to ensure the effectiveness of the interim remedy.

4.6.3 Adaptability of Extraction Well Systems

First paragraph should read: "If the initial extraction well system is not meeting the objectives of the ROD during either the system startup period or the system performance period under this contract, the system will be modified as necessary under this contract to meet these objectives. These modifications will consist of increasing or decreasing pumping rates, adding or deleting extraction wells and/or changing extraction well locations. If necessary to meet the objectives of the interim remedy, the extraction wells will be located offsite. There is flexibility built into both the extraction and treatment systems to adjust flows to accommodate different extraction rates."

Second paragraph should read: "The operational data generated under this contract will be utilized to evaluate the performanc of the system under this contract and to modify the system as necessary during this contract. The specific monitoring to b performed under this contract will be described in monitoring plans under this contract."

Page 4-34: Third paragraph appears repetitive.

13.0 CONFORMANCE TO RECORD OF DECISION REQUIREMENTS

First paragraph, next to last sentence should be revised to read: "The interim system installed and operated under this contract will be modified as necessary under this contract based on periodic evaluations of the system."

Second paragraph: After the third sentence, revise this paragraph to read - "In Area A, the extraction wells initially installed under this contract are proposed to be limited to on-base locations. However, extraction wells for Area A may installed at off-base locations under this contract if system operation data and/or RI data indicates such installation is necessary to meet the objectives of the ROD."

CONTRACT SPECIFICATIONS

SECTION 01300 SUBMITTALS

Section 01680 (Treatment Facility Operation, 3.4.4) and Section 02680 (Groundwater Extraction and Observation Wells, Subsection 1.2) refer to submittals which apparently do not fall within the four types of submittals described in this section. For example, as currently written, the definition does not provide for a submittals which include proposed plans for monitoring extraction, observation and monitoring wells (see comments on S ction 1680), and proposed plans for yield tests and well construction (see comments on Section 02680). Section 01300 should be revised as necessary to address the comments that follow in the balance of this letter.

1.6 Schedule of Submittal Descriptions

Th description of SD-12, Field Test Reports, is not consistent with the description in Section 02680, Subsection 1.2.2.

Similarly, the description of SD-12, Operation and Maintenance Manuals, does not appear to be inclusive of the monitoring plans EPA has requested (see comments on Section 01680).

SECTION 01680 TREATMENT FACILITY OPERATION

1.2.6 Treatment Process

Rather than identify specific monitoring wells, the number of monitoring wells currently projected for Areas A and B should be identified. A final list of observation and monitoring wells (with accompanying maps, construction details and rationale) will be included in plans identified in comments on Part 3 below.

First full paragraph, last two sentences should read: "The performance of the groundwater extraction system will be monitored at the extraction, observation and monitoring wells. At this time, the number of these wells is projected to be as follows:"

1.5 Sequence

This section should be revised to read:

"Monitoring of extraction, observation and monitoring wells shall commence a projected seven days prior to startup and continue

through the startup and a subsequent 12 month period of operation. Monitoring of the groundwater extraction system performance shall commence with th startup period and continue throughout the proveout period. Monitoring prior to startup will be described in a Pre-Startup Monitoring Plan to be developed by the contractor and submitted to the Navy."

The EPA requests an opportunity to review and comment on the "Pre-Startup Groundwater Monitoring Plan" prior to implementation of this plan.

PART 3 EXECUTION

EPA considers monitoring plans discussed below (and the "Pre-Startup Groundwater Monitoring Plan" referenced above) a subset of the Operation and Maintenance Plan required by Section IX.B.1 and Section IX.B.5 of the ROD, and as a result, a subset of the Remedial Design and/or Interim Remedial Action for OU-1. As such, EPA requests the opportunity to review and comment on all of the subject monitoring plans.

Generally, the organization of the sections and subsections within this Part is confusing. A reorganization should be considered for clarification purposes. In any case, this Part should be structured and written in a manner consistent with the comments below.

3.1 Preliminary Operation and Maintenance Plan

First sentence should read: "...a guide for system startup, monitoring, sampling and laboratory testing..." Note that "monitoring" in this instance will include the monitoring of extraction, observation and monitoring wells for groundwater and/or hydrogeologic parameters, as needed (e.g. water level measurements). (Currently, Sec. 3.1.1 does not specifically provide for this.)

This plan may also be referred to as the "Startup Operation and Maintenance Plan".

3.1.2 Review of Preliminary Operation and Maintenance Plan

Per comments above, EPA requests an opportunity to review and comment on the subject plan. The Navy should consult with EPA prior to initiating the startup period.

3.2.2 Startup Monitoring

As noted above, the plan for startup monitoring should include monitoring of water levels, water quality and other parameters during the startup period as necessary to assess the effectiveness of the groundwater extraction well system and as necessary to assess potential adverse effects on nearby wells and wetlands, and as necessary to help develop a "System Prove-out Monitoring Plan".

3.2.3 System Prove-out Monitoring

It is unclear why this is broken out in section separately from the following section, 3.2.4, System Performance Monitoring. It app ars this monitoring should all appear under the same heading.

3.2.4. System Performance Monitoring

Similarly, Sections 3.2.5, 3.2.5.1, 3.2.5.2, and 3.2.5.3 all appear to fall under 3.2.3.

A "System Performance (or Proveout) Operation and Maintenance Plan" should also be developed by the contractor and submitted to the Navy. This plan should also include the monitoring of groundwater parameters as necessary. Again, EPA considers this plan part of the Remedial Design and requests an opportunity to review and comment on this plan.

3.2.5 Compliance Monitoring

It should be stated what the compliance reports should include i.e. the results of the plume containment, effluent quality and emissions quality monitoring described below. The specific monitoring to be performed in each case should be previously documented in an approved monitoring and/or operation and maintenance plans for the pre-startup, startup and prove-out periods.

Are the "compliance reports" intentionally not identified as "submittals" under this contract?

3.2.5.1 Plume Containment Monitoring

D lete the current language. Rather, the test should state that the monitoring of concern will be per approved monitoring plans identified under 3.4.4 below.

3.3.4 Op ration and Maint nanc Manual

The objective of d veloping the subject manual should be stated i.e. since the plan will not be submitted to the Navy until 5 months after the prove-out period has begun, is the subject manual designed for the "post-prove-out period"? In addition, will this manual include a "post-prove-out well monitoring plan"? If not how and when will such a plan be developed?

In any case, EPA requests review and comment on the subject Manual.

3.4.4 Technical Submittals

Suggest the first heading read ("a.") read "Operation and Maintenance Plans/Manuals". The following subheadings (i.e. submittals) should then be indicated:

1. Pre-Startup Groundwater Monitoring Plan
2. Preliminary (Startup) Operation and Maintenance Plan
3. Prove-out Operation and Maintenance Plan
4. Operation and Maintenance Manual

3.4.5 Compliance Documents

EPA requests to be copied on all Plume Containment Monitoring reports.

SECTION 02095

This section does not address liquid waste such as decon water, purge water or yield test water. Where are the specifications for handling liquid waste called out?

SECTION 02220

3.5 Soil Sampling

Piles of excavated soil awaiting sampling or awaiting sampling results should be placed on, and covered with, 6 mil polyethylen to control air emissions and erosion. Is this specified? If so, where?

SECTION 02680

General Comm nt

The text in this section should state that the work described will include the steps necessary to: 1) during drilling operations, detect the potential presence of Dense Non-Aqueous Phase Liquids (DNAPL) or groundwater with sufficiently high concentrations to indicate the nearby presence of a DNAPL; 2) once DNAPL zones are encountered, modify the well construction specifications to prevent mobilization of a nearby DNAPL; and 3) modify the yield tests so as to prevent mobilization of DNAPL. At no time during the system implementation may pumping occur under an area where DNAPLS are likely to reside.

All recommendations within plans/reports required under this section should be consistent with the above.

1.2.2 SD-12, Field Test Reports

The Boring Log, Yield Test and Well Construction Reports should be submitted to EPA concurrently with submission to the Navy for review and comment.

1.2.2.1 Boring Log Report

This section makes no mention of borehole geophysics. Will the observation wells and extraction wells be logged in a manner similar to recently installed monitoring wells?

1.2.2.2 Yield Test Reports

In addition to reporting on the latest yield test, each yield test report should include recommendations regarding the nature of the next test hole and the next yield test. In addition, the yield test reports should contain recommendations regarding observation well construction.

The first "Yield Test Report" should be issued prior to the drilling of the first test hole and first yield test and describ the first test hole, the first yield test and initial observation wells to be installed.

11th line typo: "conversation" should read "conversion"(?)

It should be assumed that part of a yield test will include water quality monitoring to be determined. (See comments on 3.1.2.)

1.2.2.4 D liv ry

Water quality data generated during a yield test may not be provided in a Yield Test Report according to the schedule in 1.2.2.4. If this is the case, an alternative means of reporting this water quality data to the Navy (and EPA) in a timely manner (e.g. to allow the data to be used for developing comments on the next yield test) should be included.

1.5 Sequencing and Scheduling

The first sentence should read: "Extraction and observation well drilling and testing activities are projected to be in accordance with the following schedule. The actual schedule will be determined by yield tests."

As noted above, EPA should be provided an opportunity to review and comment on each field test report and any recommendations within. Included will be EPA comments on recommendations regarding the next test hole, the next yield test and the proposed construction of each observation well and extraction well.

3.1.2 Yield Tests

The last sentence refers to a "Test Hole Report" paragraph. These is no such paragraph. Are you referring to the "Yield Test Report" discussed in Sec. 1.2.2 ?

As each yield test proceeds, EPA should be provided an opportunity to consult regarding the specific nature of the yield test of concern.

As noted above, the yield tests are likely to require water quality monitoring and/or time-series sampling.

Clarify why the yield tests are stipulated to run for no longer than 12 hours.

Clarify how borehole collapse or sloughing will be prevented during yield tests conducted in open borehole.

DRAWINGS

Sh t C-9

Drawing indicates the collector drain slope as equal to or less than 0.5%; it should be equal to or greater than 0.5%.

Sheet C-10

Why do extraction wells E-1, E-9 and E-10 have no hi/lo level switches? In addition, it is recommended that the weld betwe n the well cover plate and the steel riser pipe be called out.

Sh et P-2 (and calculations)

Why is the steady state TSS expected to be 10 mg/l instead of th average concentration of 307 mg/l? This is not a conservativ assumption unless the designer has references to substantiate it.

The note on the drawing is different from the footnote in the calculations, and should be written more clearly.

In addition to the comments above, please note attached comments addressing additional aspects of the Remedial Design (see Enclosure).

With regard to EPA's request to review the "Draft Final Remedial Design", please notify EPA when this document can be submitted to EPA as soon as possible. Should you have any questions or comments regarding the above, please give me call at 215-597-0549.

Sincerely,

Darius Ostrauskas
Remedial Project Manager

Enclosure (1)

cc: Kathy Davies
Ben Mykijewycz
David Kennedy, DER
Tom Ames, NAWC
Alfred (Bud) Ziegler

ENCLOSURE TO LETTER OF JUNE 3, 1994

DESIGN ANALYSIS REPORT

INTERIM REMEDIAL ACTION
OU-1 GROUNDWATER PUMP AND TREAT SYSTEM

NAVAL AIR WARFARE CENTER
WARMINSTER, PA

COMMENTS:

1. CAUSTIC STORAGE

Th specifications indicate that the building will be heated to 50 degrees Fahrenheit. Caustic (50% NaOH) is used to raise the pH of the water to the inclined plate separator. The feed tank is heat traced. However, the caustic is stored in 50 gallon steel drums and transferred to the feed tank by hand pump and hose. Fifty percent caustic freezes (solidifies) at fifty degrees Fahrenheit and is very difficult to melt (liquify) after is frozen. It may be desirable to maintain an operating temperature of in the building at some temperature above this - say 55 degrees - as an additional precaution.

2.FLOW RATE CONTROL - PROCESS SYSTEM

There are major reservations concerning the ability of the system to operate satisfactorily based on the amount of operator attention indicated in the report - only "daily checks on weekends and holidays".

A level monitoring system will stop flow from the Groundwater Transfer Pumps, in sequence, as the water level rises in the Groundwater Transfer Stations. This will, in turn, stop operation of the extraction well pumps for that area, A or B. The Transfer pumps will restart when the water level pumps down to a low level in the Transfer Station. This is essentially an on - off system with the frequency of on - off operation dependent on the volume of water between the high and low level switches, how well the rate of the Groundwater Transfer Pump matches the pumping rate of the extraction well pumps, and how well the combined rate of the Groundwater Transfer Pumps matches the rate of the Equalized Influent Transfer Pump moderated by consideration of the volume between high and low switch levels in the Equalization Tank. All of these rates are manually adjusted.

The Transfer Pumps are variable speed pumps and a level band has been provided in which pump speed will be varied to moderate the possibility of on - off operation. Despite this, to obtain

continuous operation without on - off cycles will be quite a balancing act.

Since the capability of moderating flow rate by control of the variable speed drive motors already exists, it would be inexpensive to provide control of pump rate based on level in the Groundwater Transfer Station. This is an important consideration toward maintaining a constant system flow rate consistent with the pumping rate from the extraction wells.

Feed rate of caustic soda (50% NaOH) to the equalization tank to obtain a pH of 9.0 is dependent on manual adjustment of the caustic feed rate. Feed will be stopped when the pH measured in the Equalization Tank reaches a "high pH level" and restarted when the "low pH level" is reached. This may be operable but the change of pH with moderate changes in caustic feed rate could easily make this a system that is an on - off system with pH varying from an excessive high to an excessive low. This would be evidenced by on - off action of the caustic feed on a cyclical basis with very little actual control of pH. This will be exacerbated by fluctuation of process system flow rate.

The hydrogen peroxide feed is at a manually adjusted rate and is constant regardless of flow into or out of the Equalization Tank. This can result in excessive feed of H_2O_2 when the Equalized Influent Transfer Pump is off. From a process standpoint this is not especially important; from the standpoint of corrosion of unlined carbon steel surfaces contacted by the solution, this is not desirable. Discussion indicated that carbon steel surfaces in contact with this solution will be coated or lined. If this is the case, the report should so state.

The polymer feed system is at a manually controlled rate and is either on or off. This can result in overfeed of polymer when the Equalized Influent Pump is off. This is undesirable since effective coagulation is dependent upon polymer dosage within a reasonably narrow range.

The pH neutralization system is dependent upon feeding hydrochloric acid (35 % HCl) at a manually adjusted rate to reduce the pH from a theoretical 9.0 to a neutral range of pH 6.5 to 7.5. The rate of change of pH with a minor change in hydrochloric acid feed rate at this pH range makes this a system that is questionable; it probably won't work.

Discussions at the meeting indicated that this range has been expanded to pH 6.5 to 9.0. This expanded range will undoubtedly increase the possibility of control of pH by manual adjustment of the feed rate. However, since this control of pH by manual adjustment of the feed rate is dependent upon the flow rate in th process system, control of this flow rate is of increased importance.

The use of pH control, incorporation of a pH control system to control the rate of acid introduction, is a simple and inexpensive matter. It should be giv n careful consideration.

The difficulties relating to process control as a result of manual control of system flow rates could be eliminated by flow control regulated by water level in the units from which pumping is required. This can be readily accomplished with a slight and reasonable increase in project price. This would ease the burden on operating personnel as well as providing a more satisfactory system from a process standpoint, especially on weekends and holidays when operation attention will be limited.

F ed to the Air Stripper from the Neutralization Tank is by gravity. The Air Stripper Effluent Pump is controlled by level in the Air Stripper Sump. In normal operation - pump control on automatic - the pump will be stopped at low level and restarted at high level. It will be desirable to arrange the pump rate to xceed the gravity flow rate in the system preceding the Air Stripper. While sump capacity has not been indicated, it is estimated to be about 375 gallons or 4.5 minutes at rated system capacity of 86 GPM. Any imbalance in flow rates will cause cyclic operation of this pump with attendant wear. Discussions at the May 26 meeting indicated this capacity at much less than 375 gallons, which aggravates this situation. Again - with variable speed drive motors on the pumps, rate control based on the water level in the sump of the Air Stripper is a simple matter and could be a very desirable feature.

CONCLUSIONS

While the on - off aspect of flow control is undesirable from the aspect of wear on the pumps and motors, it may be acceptable from a process standpoint. Improved process performance and assurance of process flow at a continuous and controlled rate can be easily and inexpensively provided. This should be done.

The pH neutralizing system with manual control of the acid feed rat may not provide satisfactory control of pH within the range necessary to permit discharge to surface waters. A pH control system and process flow rate control based on level in the various units from which pumping is accomplished, specifically those ahead of the point of introduction of acid, will make this an assuredly operable pH control system.